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(54) Title: NUCLEIC ACID MOLECULES AND OTHER MOLECULES ASSOCIATED WITH SOYBEAN CYST NEMATODE RESISTANCE

rhg1 LRR

consensus LRR	L F S N L P	N L E E L D L S N N	L T	S L P P G
	a x x a x	x L x x L x L x x N	L	I
LRR 177-200	T L G L L P	G L R K L S L H D N Q	I G	G S I P S
LRR 201-224	S L G F C P	N L R G V Q L F N N R	L T	G S I P L
LRR 225-248	L A N S T	L L Q S L D L S N N L	L T	G A I P Y S
LRR 249-272	L T H S F	K L Y W L N L S F N S	F S	G P L P A S
LRR 273-297	W G G N S K	S L T F L S L Q N N N	L S	G S L P N S
LRR 302-325	L G S L R	R L Q N L I L D H N F	F T	G D V P A S
LRR 326-349	I G T L S	E L N E L S L S H N K	F S	G A I P N E
LRR 350-373	T L S N L S	R L K T L D I S N N A	L N	G N L P A
LRR 374-397	S L G R L R	S L T L L N A E N N L	L D	N Q I P Q
LRR 398-421	S I A N I S	N L S V L I L S R N Q	F S	G H I P S
LRR 422-445	S F D S Q R	S L R Q L D L S L N N	F S	G E I P V
LLR 446-470	L L A K K F N S L N	L F N V S N S	L S	G S V P P

(57) Abstract: The present invention is in the field of soybean genetics. More specifically, the invention relates to molecules from regions of the soybean genome, which are associated with soybean cyst nematode resistance. The invention relates to proteins encoded by such nucleic acid molecules as well as antibodies capable of recognizing them. The invention also relates to nucleic acid markers from regions of the soybean genome, which are associated with soybean cyst nematode resistance. Moreover, the invention relates to uses of such molecules, including, transforming soybean cyst nematode resistant plants with constructs containing nucleic acid molecules from regions of the soybean genome, which are associated with soybean cyst nematode resistance. Furthermore, the invention relates to the use of such molecules in a plant breeding program.

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# NUCLEIC ACID MOLECULES AND OTHER MOLECULES ASSOCIATED WITH SOYBEAN CYST NEMATODE RESISTANCE

## FIELD OF THE INVENTION

The present invention is in the field of soybean genetics. More specifically, the invention relates to nucleic acid molecules from regions of the soybean genome, which are associated with soybean cyst nematode (SCN) resistance. The invention also relates to proteins encoded by such nucleic acid molecules as well as antibodies capable of recognizing these proteins. The invention also relates to nucleic acid markers from regions of the soybean genome, which are associated with SCN resistance. Moreover, the invention relates to uses of such molecules, including, transforming SCN sensitive soybean with constructs containing nucleic acid molecules from regions in the soybean genome, which are associated with SCN resistance. Furthermore, the invention relates to the use of such molecules in a plant breeding program.

## BACKGROUND OF THE INVENTION

The soybean, *Glycine max* (L.) Merrill (*Glycine max* or soybean), is one of the major economic crops grown worldwide as a primary source of vegetable oil and protein (Sinclair *et al.*, *Compendium of Soybean Diseases*, 3<sup>rd</sup> Ed. APS Press, St. Paul, MN, p. 106. (1989)). The growing demand for low cholesterol and high fiber diets has also increased soybean's importance as a health food.

to 1940 cultivars were either direct releases of introductions

locally diverse plant introductions.

day crop in the early part of the 19th century.

seeded types useful for feed grain and oil production.

On the 1960's, gains in soybean seed yields were achieved by

ing method from evaluation and selection of introduced germplasm to

ate by elite lines. The continuous cycle of cross hybridizing the elite strains

ected from the progenies of previous crosses resulted in the modern day cultivars.

relates to nucleic acid  
proteins. The invention also  
can cyst nematode resistance.  
nematode resistant soybean with  
associated with soybean cyst nematode  
breeding program.

What is claimed is:

1. A method for the production of a soybean plant having an *rhg1* SCN resistant allele comprising:

(A) crossing a first soybean plant having an *rhg1* SCN resistant allele with a second soybean plant having an *rhg1* SCN sensitive allele to produce a segregating population;

(B) screening said segregating population for a member having an *rhg1* SCN resistant allele with a first nucleic acid molecule capable of specifically hybridizing to linkage group G, wherein said first nucleic acid molecule specifically hybridizes to a second nucleic acid molecule that is linked to said *rhg1* SCN resistant allele; and,

(C) selecting said member for further crossing and selection.

2. The method for the production of a soybean plant according to claim 1, wherein said first nucleic acid molecule is capable of specifically hybridizing to said second nucleic acid molecule having the nucleic acid sequence of SEQ ID NO: 2, 3, complements thereof, or fragments thereof having at least 15 nucleotides.

3. The method for the production of a soybean plant according to claim 1, wherein said first nucleic acid molecule is capable of specifically hybridizing to said second nucleic acid molecule having the nucleic acid sequence of SEQ ID NO: 5 or 6, complements thereof, or fragments thereof having at least 15 nucleotides.

4. The method for the production of a soybean plant according to claim 1, wherein said first nucleic acid molecule is a nucleic acid marker capable of detecting *rhg1* haplotype 2 or 4.

5. The method for the production of a soybean plant according to claim 1, wherein said first nucleic acid molecule is capable of specifically hybridizing to a nucleic acid molecule having a sequence that is present on linkage group G within 100kb of said *rhg1* SCN sensitive allele.

6. The method for the production of a soybean plant according to claim 5, wherein said first nucleic acid molecule is capable of specifically hybridizing to a nucleic acid molecule having a sequence that is present on linkage group G and located within 50kb of said *rhg1* SCN sensitive allele.

**rhg1 LRR**

cons nsus LRR	LFSNLP	NLEELDLSNN	LT	SLPPG
	a x x a x	x L x x L x L x x N	L	I
LRR 177-200	TLGLLP	GLRKLSLHDNQ	IG	GSIPS
LRR 201-224	SLGFCP	NLRGVQLFNRR	LT	GS IPL
LRR 225-248	LANST	LLQSLDLSNNL	LT	GAIPYS
LRR 249-272	LTHSF	KLYWLNLSFNS	FS	GPLPAS
LRR 273-297	WGGNSK	SLTFLSLQNNN	LS	GSLPNS
LRR 302-325	LGS LR	RLQNLILDHNF	FT	GDVPAS
LRR 326-349	IGTLS	ELNELSLSHNK	FS	GAIPNE
LRR 350-373	TLSNLS	RLKTLDISNNA	LN	GNLPA
LRR 374-397	SLGR LR	SLTLLNAENNL	LD	NQIPQ
LRR 398-421	SIANIS	NLSVLILSRNQ	FS	GHIPS
LRR 422-445	SFD SQR	SLRQLDLSLNN	FS	GEIPV
LRR 446-470	LLAKKFNSLN	LFNVSNNS	LS	GSVPP

**Figure 1****Rhg4 LRR**

consensus LRR	LFSNLP	NLEELDLSNN	LT	SLPPG
LRR 34-57		HVTSISLASHS	LT	GTLPSD
LRR 58-80	LNSLS	QLRTL SLQDNS	L	GTLPS
LRR 81-104	LSNLS	FLQTVYLNRNN	FS	SVPT
LRR 105-130	AFASLT	SLQTL SLG SNP	ALQPWSFPTD	
LRR 131-154	LTSSS	NLIDL DLATVS	LT	GPLPDI
LRR 155-178	FDKFP	SLQHLRLSYNN	LT	GNLPSS
LRR 179-203	FSAAN	NLET LWLNNQAAGLS	LT	GTLL
LRR 227-250	LSNMS	ALSDLQLRDNQ	LT	GVVPA
LRR 251-274	SLTSLP	SLKKVSLDNNE	LQ	GPVPV
LRR 333-356	FGKGVN	KIITVNF EKQG	LQ	GTISP
LRR 357-380	AFANLT	DLRTLFLNGNN	LI	GSIPD
LRR 381-404	SLITLP	QLQTL DVSDNN	LS	GLVPK
	FPPKVK			

**Figure 2**